

P-8.2 Compare the nuclear binding energy to the energy released during a nuclear reaction, given the atomic masses of the constituent particles.

Revised Taxonomy Levels 2.6 B Compare conceptual knowledge

In physical science the students were introduced to nuclear fission and fusion. Students were introduced to the concept of mass turning into energy in nuclear reactions and practical applications of this concept.

It is essential for the students to:

- ❖ Understand that the total mass of a nucleus is always less than the sum of the masses of its nucleons.
 - Because mass is another manifestation of energy, the total energy of the bound system (the nucleus) is less than the combined energy of the separated nucleons.
- ❖ Understand that this difference in (mass equivalent) energy is called the binding energy of the nucleus and can be thought of as the energy that must be added to a nucleus to break it apart into its components.
 - In order to separate a nucleus into protons and neutrons energy must be put into the system.
- ❖ Compare the nuclear mass defect and nuclear binding energy given the mass of the nucleons.

Assessment

As the indicator states, the major focus of assessment is to compare (detect correspondences). Students should compare the nuclear binding energy to the energy released during a nuclear reaction.

Because the indicator is written as conceptual knowledge, assessments should require that students understand the “interrelationships among the basic elements within a larger structure that enable them to function together.” In this case, assessments should show that students can compare the relationships between nuclear binding energy and the energy released during a nuclear reaction.